

WHAT IS CLAIMED IS:

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1. A braking pressure control apparatus for
controlling a pressure of a working fluid in a brake cylinder of a
hydraulically operated brake in a hydraulically operated braking
system, said braking pressure control apparatus comprising:

a first hydraulic pressure source including a
power-operated pressurizing device for pressurizing the fluid;

a second hydraulic pressure source operable by an
operation of a manually operable brake operating member, to
pressurize the fluid to a pressure higher than a level
corresponding to an operating force acting on said brake
operating member;

a switching device for selectively placing the braking
system in a first operating state in which said brake cylinder is
operated with the pressurized fluid delivered from said first
hydraulic pressure source while said brake cylinder is
disconnected from said second hydraulic pressure source, and a
second operating state in which said brake cylinder is operated
with the pressurized fluid delivered from said second hydraulic
pressure source while said brake cylinder is disconnected from
said first hydraulic pressure source; and

at least one of (a) ^{means} a change restricting device operable
upon a switching of the braking system between said first and
second operating states by said switching device, to restrict at
least one of a change of an operating state of said brake operating
member and a change of the fluid pressure in said brake cylinder,

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which changes take place due to said switching, and (b) a switching control device operable to control said switching device on the basis of a running condition of a vehicle which has a wheel to be braked by said hydraulically operated brake.

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2. A braking pressure control apparatus according to claim 1, wherein said second hydraulic pressure source includes at least one of a booster for boosting the operating force of said brake operating member, and a pressure-increasing device for increasing the fluid pressure generated by operation of said brake operating member.

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3. A braking pressure control apparatus according to claim 1, wherein said second hydraulic pressure source includes a hydraulic booster for boosting the operating force of said brake operating member, said hydraulic booster being operable with a pressurized fluid having a pressure higher than a maximum pressure that can be generated by said second hydraulic pressure source based on the operating force of said brake operating member.

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4. A braking pressure control apparatus according to claim 3, wherein said hydraulic booster includes a pressure regulating device operable to regulate the pressure of a pressurized fluid received a pressure source, to a level corresponding to the operating force of said brake operating member, said hydraulic booster having a booster chamber which

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receives the pressurized fluid whose pressure has been regulated by said pressure regulating portion, said booster chamber being partially defined by a rear end of a pressurizing piston which is operatively connected to said brake operating member.

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5. A braking pressure control apparatus according to claim 1, wherein said switching device includes a solenoid-operated cut-off valve disposed in a fluid passage which connects said second hydraulic pressure source and said brake cylinder, and said change restricting device includes a solenoid-operated-cut-off valve control portion for controlling said solenoid-operated cut-off valve.

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6. A braking pressure control apparatus according to claim 5, wherein said second hydraulic pressure source includes a power piston operatively connected to said brake operating member, a pressurizing piston connected to said power piston, a pressure source capable of delivering a pressurized fluid, and a pressure regulating device operable to regulate the pressure of the pressurized fluid received from said pressure source to a level corresponding to the operating force of said brake operating member, said second hydraulic pressure source having a first pressure chamber which is partially defined by a rear end face of said power piston and which receives the pressurized fluid whose pressure has been regulated by said pressure regulating device, said second hydraulic pressure source further having a second pressure chamber partially defined by a

front end face of said pressurizing piston,

and wherein the hydraulically operated braking system includes a plurality of brake cylinders including at least one first brake cylinder connected through a first fluid passage to said first pressure chamber, and at least one second brake cylinder connected through a second fluid passage to said second pressure chamber, said change restricting device includes a first solenoid-operated cut-off valve provided in said first fluid passage, and a second solenoid-operated cut-off valve provided in said second fluid passage,

said solenoid-operated-cut-off-valve control portion being operable to control at least one of said first and second solenoid-operated cut-off valves, for restricting at least one of (1) at least one of a difference between the fluid pressure in said at least one first brake cylinder and the fluid pressure in said first pressure chamber, and a difference between the fluid pressure in said at least one second brake cylinder and the fluid pressure in said second pressure chamber, and (2) a difference between the fluid pressures in said at least one first brake cylinder and said at least one second brake cylinder.

7. A braking pressure control apparatus according to claim 6, wherein said solenoid-operated-cut-off-valve control portion is operable upon switching of the braking system from said first operating state to said second operating state, to open said second solenoid-operated cut-off valve so as to permit flows of the fluid through said second fluid passage, before

opening said first solenoid-operated cut-off valve.

8. A braking pressure control apparatus according to claim 5, wherein said solenoid-operated cut-off valve is a solenoid-operated flow control valve whose amount of opening for fluid flows therethrough changes with an amount of electric current applied thereto,

and wherein said solenoid-operated-cut-off-valve control portion controls said amount of opening of said solenoid-operated flow control valve on the basis of a difference between the fluid pressure in said brake cylinder and the pressure of the fluid pressurized by said second hydraulic pressure source.

9. A braking pressure control apparatus according to claim 5, wherein said solenoid-operated cut-off valve is a solenoid-operated shut-off valve which has a solenoid coil and which is selectively placed in an open state and a closed state by energization and de-energization of said solenoid coil,

and wherein said solenoid-operated-cut-off-valve control portion includes a duty-control portion operable to control a duty ratio of said solenoid-operated shut-off valve.

10. A braking pressure control apparatus according to claim 5, wherein said solenoid-operated-cut-off-valve control portion controls said solenoid-operated cut-off valve while an absolute value of a difference between the fluid pressure in said brake cylinder and the pressure of the fluid pressurized by

said second hydraulic pressure source is larger than a predetermined threshold.

5 11. A braking pressure control apparatus according to claim 5, wherein said solenoid-operated-cut-off-valve control portion initiates controlling said solenoid-operated cut-off valve upon detection of a symptom indicating a high degree of probability that said switching device switches the braking system between said first operating state and said second operating states.

10 12. A braking pressure control apparatus according to claim 5, wherein said solenoid-operated-cut-off-valve control portion is operable only when the braking system is switched from said first operating state to said second operating state, and is inoperable when the braking system is switched from said second operating state to said first operating state.

15 13. A braking pressure control apparatus according to claim 1, wherein said change restricting device includes an orifice provided between said second hydraulic pressure source and said brake cylinder.

20 14. A braking pressure control apparatus according to claim 6, wherein said change restricting device includes:

25 a connecting passage connecting said first fluid passage

connecting said first pressure chamber and said at least one first brake cylinder, and said second fluid passage connecting said second pressure chamber and said at least one second brake cylinder, said connecting passage being connected at one end thereof to a portion of said first fluid passage between said first solenoid-operated cut-off valve and said at least one first brake cylinder, and at the other end thereof to a portion of said second fluid passage between said second solenoid-operated cut-off valve and said at least one second brake cylinder;

a communication valve provided in said connecting passage, and operable between a closed state therefore for inhibiting flows of the fluid through said connecting passage, and an open state for permitting the flows of the fluid through said connecting passage; and

a communication control portion operable when the braking system is switched between said first and second operating states, to open said communication valve, and open at least one of said first and second solenoid-operated cut-off valves.

15. A braking pressure control apparatus according to claim 1, wherein said first hydraulic pressure source includes a solenoid-operated pressure control valve device disposed between said pressurizing device and said brake cylinder and operable to control the fluid pressure in said brake cylinder while the braking system is placed in said first operating state,

and wherein said change restricting device includes a control-state-change restricting portion operable upon said switching of the braking system between said first and second operating states, to control said solenoid-operated pressure control valve device, so as to restrict a change in a manner of control of the fluid pressure in said brake cylinder before and after said switching of the braking system.

16. A braking pressure control apparatus according to claim 1, wherein the braking system comprising a stroke simulator device including a stroke simulator connected to a fluid passage connecting said second hydraulic pressure source and said brake cylinder, and a simulator cut-off valve having a closed state for disconnecting said stroke simulator from said fluid passage and an open state for communicating said stroke simulator with said fluid passage,

and where said change restricting device includes a fluid-flow control portion operable upon said switching of the braking system between said first and second operating states, to control said simulator cut-off valve, for controlling at least one of a flow of the fluid from said fluid passage into said stroke simulator and a flow of the fluid from said stroke simulator into said fluid passage.

17. A braking pressure control apparatus according to claim 16, wherein said switching device includes a solenoid-operated cut-off valve disposed in a fluid passage which

connects said second hydraulic pressure source and said brake cylinder, and said change restricting device includes a valve-opening control portion for opening said solenoid-operated cut-off valve and said simulator cut-off valve at different times.

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18. A braking pressure control apparatus according to claim 17, wherein said valve-opening control portion opens said solenoid-operated cut-off valve before opening said simulator cut-off valve, when said switching device is commanded to switch the braking system from said first operating state to said second operating state.

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19. A braking pressure control apparatus according to claim 16, wherein said change restricting device includes a brake-off switching portion operable to effect at least one of a switching operation of said solenoid-operated cut-off valve between the closed and open states and a switching operation of said simulator cut-off valve between the closed and open states, while said brake operating member is not in operation.

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20. A braking pressure control apparatus according to claim 19, wherein said brake-off switching control portion is operated to initiate at least one of said switching operations of said solenoid-operated cut-off valve and said simulator cut-off valve after detection of a non-operated state of said brake operating member after a predetermined condition for

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switching the braking system between said first operating state and said second operating state is satisfied.

5 21. A braking pressure control apparatus according to claim 16, wherein said change restricting device includes a simulator-valve control portion operable when a predetermined condition for switching the braking system from said second operating state to said first operating state, to control said simulator cut-off valve.

10 22. A braking pressure control apparatus for controlling a pressure of a working fluid in a brake cylinder in a hydraulically operated braking system, said braking pressure control apparatus comprising:

15 a first hydraulic pressure source including a power-operated pressurizing device for pressurizing the fluid;

20 a second hydraulic pressure source operable by an operation of a manually operable brake operating member, to pressurize the fluid to a pressure corresponding to an operating force acting on said brake operating member; and

25 a switching device for selectively placing the braking system in a first operating state in which a pressure of the fluid in said brake cylinder is controlled on the basis of the pressurized fluid delivered from said first hydraulic pressure source while said brake cylinder is disconnected from said second hydraulic pressure source, and a second operating state in which the pressurized fluid is delivered from said second hydraulic pressure

source to said brake cylinder while said brake cylinder is disconnected from said first hydraulic pressure source.

23. A braking pressure control apparatus according to claim 22, wherein said second hydraulic pressure source includes at least one of (1) a booster operable with a pressurized fluid whose pressure is higher than a maximum pressure that can be generated by said second hydraulic pressure source in the absence of said booster, said booster boosting said operating force of said brake operating member, and (2) a pressure-increasing device operable to increase the pressure of the fluid pressurized by the operation of said brake operating member.

24. A braking pressure control apparatus according to claim 22, further comprising a pressure-difference reducing device operable to reduce a difference between the fluid pressure in said brake cylinder and the pressure of the fluid pressurized by said second hydraulic pressure source, when the braking system is switched between said first and second operating states by said switching device.

25. A braking pressure control apparatus according to claim 22, further comprising a flow-amount reducing device operable to reduce amounts of flow of the fluid between said second hydraulic pressure source and said brake cylinder when the braking system is switched between said first and

second operating states by said switching device.

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26. A braking pressure control apparatus according to claim 22, further comprising a change-rate restricting device for restricting a rate of change of the fluid pressure in said brake cylinder when the braking system is switched between said first and second operating states by said switching device.

27. A braking pressure control apparatus according to claim 22, wherein said switching device is operated to effect at least a switching operation of the braking system from said first operating state to said second operating state, while said brake operating member is not in operation.

28. A braking pressure control apparatus according to claim 22, further comprising a control-state-change restricting device operable to restrict a change in a control characteristic of the fluid pressure in said brake cylinder when the braking system is switched between said first and second operating states by said switching device.

29. A braking pressure control apparatus according to claim 28, wherein said control-state-change restricting device is operable to change said control characteristic each time said brake operating member is operated, such that the control characteristic during switching of the braking system

is changed toward a nominal control characteristic of one of said first and second operating states to which the braking system is switched.

5 30. A braking pressure control apparatus according to claim 22, further comprising an influence reducing device operable to reduce an influence of the switching of the braking system by said switching device on an operating state of said brake operating member, which influence is unexpected to
10 an operator of the brake operating member.

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31. A braking pressure control apparatus according to claim 22, further comprising a modified-pressure-control device operable to control the fluid pressure in said brake cylinder during the switching of the braking system by said switching device, in a manner different from normal manners in which the fluid pressure in the brake cylinder is controlled in said first and second operating states.

20 32. A braking pressure control apparatus according to claim 22, further comprising a forecasting-type change restricting device operable to initiate an operation to restrict at least one of a change of an operating state of said brake operating member and a change of the fluid pressure in
25 said brake cylinder, upon detection of a symptom indicating a high degree of probability that the braking system is switched between said first and second operating states by said switching

device.

33. A braking pressure control apparatus according to claim 1, wherein said switching device is operable in at least one of said first and second states, to establish a third state in which said brake cylinder is operated by both of said first and second hydraulic systems.

34. A braking pressure control apparatus according to claim 33, wherein said switching control device includes a ratio control portion operable to control said switching device for controlling a ratio of a rate of flow of the pressurized fluid from said first hydraulic pressure source to said brake cylinder to a rate of flow of the pressurized fluid from said second hydraulic pressure source to said brake cylinder.

35. A braking pressure control apparatus according to claim 34, wherein said hydraulically operated brake is provided for braking a wheel of a vehicle, and said ratio control portion includes a ratio determining portion for determining said ratio on the basis of a state of said vehicle.

36. A braking pressure control apparatus according to claim 33, wherein said first hydraulic pressure source includes (a) a power-operated pressurizing device operable to pressurize the fluid, and (b) a pressure control valve device operable to control the pressure of the fluid pressurized by said

pressurizing device,

and wherein said second hydraulic pressure source includes (a) a master cylinder operable to pressurize the fluid to a level corresponding to said operating force of said brake operating member, and (b) at least one of a hydraulic booster operable with the pressurized fluid delivered from said pressurizing device, to boost said operating force and transmit the boosted operating force to said master cylinder, and a pressure-increasing device operable with the pressurized fluid delivered from said pressurizing device, to increase the pressure of the fluid pressurized by said master cylinder and supply the pressurized fluid having the increased pressure to said brake cylinder,

said switching control device including a pressurized-fluid distributing portion operable to control a ratio of a rate of flow of the pressurized fluid from said pressurizing device to said brake cylinder through said pressure control valve device to a rate of flow of the pressurized fluid from said pressurizing device to said at least one of said hydraulic booster and said pressure-increasing device.

37. A braking pressure control apparatus according to claim 33, wherein said switching device includes a selectively cutting-off device operable between a first cut-off state in which said brake cylinder is communicated with said first hydraulic pressure source and is disconnected from said second hydraulic pressure source, and a second cut-off state in which

said brake cylinder is communicated with said second hydraulic pressure source and is disconnected from said first hydraulic pressure source.

5 38. A braking pressure control apparatus
according to claim 33, wherein said hydraulically operated brake
is provided for braking a wheel of a vehicle, and said switching
control device commands said switching device to establish said
first state, when a running condition of said vehicle requires said
10 brake cylinder to be operated with the pressurized fluid whose
pressure does not corresponds to said operating force of said
brake operating member.

15 39. A braking pressure control apparatus
according to claim 33, wherein said hydraulically operated brake
is provided for each of four wheels of a vehicle, and said
switching control device commands said switching device to
establish said first state, when a running condition of said
vehicle does not requires the brakes for the four wheels to be
20 controlled in the same manner.

25 40. A braking pressure control apparatus
according to claim 33, wherein said hydraulically operated brake
is provided for braking a wheel of a vehicle, and said switching
control device commands said switching device to establish said
first state, when a running condition of said vehicle requires said
brake cylinder to be operated with the pressurized fluid whose

pressure is different from the pressure of the fluid pressurized by said second hydraulic pressure source.

5 41. A braking pressure control apparatus according to claim 33, wherein said hydraulically operated brake is provided for braking a wheel of a vehicle, and said switching control device commands said switching device to establish said second state, when said vehicle which has been inhibited from running is permitted to run.

10 42. A braking pressure control apparatus according to claim 33, wherein said hydraulically operated brake is provided for braking a wheel of a vehicle, and said switching control device commands said switching device to establish said second state, when said vehicle is stationary.

15 43. A braking pressure control apparatus according to claim 33, wherein said hydraulically operated brake is provided for braking a wheel of a vehicle, and said switching control device includes a braking pressure control device operable when said first state is established by said switching device and when said vehicle is stationary, to control the pressure of the pressurized fluid by which said brake cylinder is operated, to a level of the fluid pressurized by said second hydraulic pressure source.

20 25 44. A braking pressure control apparatus

according to claim 33, further comprising a braking pressure control device operable when said first state is established by said switching device, to control the pressure of the pressurized fluid by which said brake cylinder is operated, on the basis of an operating amount of said brake operating member, and at least one of a rate of change of said operating amount and a derivative of said rate of change.

45. A braking pressure control apparatus according to claim 33, further comprising:

a stroke simulator device operable to permit flows of the fluid to and from said second hydraulic pressure source, according to an operation of said brake operating member; and

a diagnosing device for diagnosing said stroke simulator device for any abnormality thereof,

and wherein said switching control device commands said switching device to establish said second state, when said diagnosing device determines that said stroke simulator device is abnormal.

46. A braking pressure control apparatus according to claim 33, further comprising:

a brake-operating-state detecting device for detecting an operating state of said brake operating member;

a diagnosing device for diagnosing said brake-operating-state detecting device for any abnormality thereof; and

a first-pressure-source control device for controlling the pressure of the fluid pressurized by said first hydraulic pressure source, on the basis of an output signal of said brake-operating-state detecting device,

5 and wherein said switching control device commands said switching device to establish said second state, when said diagnosing device determines that said brake-operating-state detecting device is abnormal.

10 47. A braking pressure control apparatus according to claim 33, further comprising:

a stroke detecting device for detecting an operating stroke of said brake operating member;

15 a force detecting device for detecting said operating force of said brake operating member;

a diagnosing device for diagnosing said stroke detecting device and said force detecting device for any abnormality thereof;

20 a first pressure control device operable when said stroke detecting device and said force detecting device are normal, to control the pressure of the pressurized fluid by which said brake cylinder is operated, on the basis of both the operating stroke and the operating force which are respectively detected by said stroke detecting device and said force detecting device; and

25 a second pressure control device operable when one of said stroke detecting device and said force detecting device is abnormal, to control the pressure of the pressurized fluid by said

brake cylinder is operated, on the basis of an output signal of the other of said stroke detecting device and said force detecting device.

5 48. A braking pressure control apparatus according to claim 33, further comprising:

a plurality of operating-state detecting devices for detecting an operating state of said brake operating member;

a diagnosing device for diagnosing each of said plurality of operating-state detecting devices for any abnormality thereof;

10 a first pressure control device operable when said plurality of operating-state detecting devices are normal, to control the pressure of the fluid pressurized by said first hydraulic pressure source on the basis of at least one of output signals of said plurality of operating-state detecting devices; and

15 a second pressure control device operable when at least one of said plurality of operating-state detecting devices is normal and when at least one of said plurality of operating-state detecting devices is abnormal, to control the pressure of the fluid pressurized by said first hydraulic pressure source, on the basis of an output signal of said at least one operating-state detecting device which is normal.

20 49. A braking pressure control apparatus according to claim 33 which is provided for controlling the pressure of the pressurized fluid in each of a plurality of brake cylinders of a plurality of brakes, and wherein said first

hydraulic pressure source includes a plurality of pressure control valve devices which are operable independently of each other to control the pressures of the pressurized fluid in said plurality of brake cylinders, on the basis of the fluid pressurized by said pressurizing device, said braking pressure control apparatus further comprising:

a plurality of braking-pressure detecting devices for detecting the pressure in said plurality of brake cylinders, respectively;

a diagnosing device for diagnosing each of said braking-pressure detecting devices for any abnormality thereof;

a connecting passage connecting two of said plurality of brake cylinders;

a communicating valve provided in said connecting passage;

a first pressure control device operable when said plurality of braking-pressure detecting devices are all normal, to control said plurality of pressure control valve devices on the basis of the pressures detected by said braking-pressure detecting devices; and

a second pressure control device operable when one of said plurality of braking-pressure control devices is abnormal and when the braking-pressure detecting device corresponding to the brake cylinder connected through said connecting passage to the brake cylinder corresponding to said abnormal braking-pressure detecting device is normal, said second pressure control device controlling the two pressure control valve devices connected to

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each other by said connecting passage, on the basis of the pressure detected by the normal braking-pressure detecting device, while said communicating valve in said connecting passage is open.

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50. A braking pressure control apparatus according to claim 33, which is provided for controlling the pressure of the pressurized fluid in each of a plurality of brake cylinders of a plurality of brakes, and wherein said first hydraulic pressure source includes a plurality of pressure control valve devices which are operable independently of each other to control the pressures of the pressurized fluid in said plurality of brake cylinders, on the basis of the fluid pressurized by said pressurizing device, said braking pressure control apparatus further comprising:

a diagnosing device for diagnosing each of said pressure control valve devices for any abnormality thereof;

a connecting passage connecting two of said plurality of brake cylinders;

a communicating valve provided in said connecting passage;

a first pressure control device operable when said plurality of pressure control valve devices are all normal, to control the pressures in said plurality of brake cylinders, by controlling said plurality of pressure control valve devices, respectively; and

a second pressure control device operable when said diagnosing device determines that at least one of said plurality of

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pressure control valve is abnormal and when the pressure control valve device corresponding to the brake cylinder connected through said connecting passage to the brake cylinder corresponding to said abnormal pressure control valve device is normal, said second pressure control device controlling the pressures in the two brake cylinders connected to each other by said connecting passage, by controlling the normal pressure control valve device, while said communicating valve in said connecting passage is open.

51. A braking pressure control apparatus according to claim 33, which is provided for controlling the pressure of the pressurized fluid in each of four brake cylinders of four brakes, and wherein said first hydraulic pressure source includes four pressure control valve devices which are operable independently of each other to control the pressures of the pressurized fluid in said four brake cylinders, on the basis of the fluid pressurized by said pressurizing device, said braking pressure control apparatus further comprising:

a diagnosing device for diagnosing each of said four pressure control valve devices for any abnormality thereof;

a first pressure control device operable when said four pressure control valve devices are all normal, to control the pressures in said plurality of brake cylinders, by controlling said four pressure control valve devices, respectively; and

a second pressure control device operable when said diagnosing device determines that one of said four pressure

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5 control valve device is abnormal, to control the pressure in each of the brake cylinders corresponding to the normal pressure control valve devices, by controlling said normal pressure control valve devices, while the brake cylinder corresponding to the abnormal pressure control valve device is disconnected from both of said first and second hydraulic pressure sources.

10 52. A braking pressure control apparatus for controlling a pressure of a working fluid in at least one first brake cylinder of a first cylinder group, and the pressure of the fluid in at least one second brake cylinder of a second cylinder group, said braking pressure control apparatus comprising:

15 a first hydraulic pressure source including (1) a power-operated pressurizing device for pressurizing the fluid, and (2) a plurality of pressure control valve devices corresponding to said at least one first brake cylinder and said at least one second brake cylinder, said pressure control valve devices being operable to control the pressures of the fluid in the corresponding wheel brake cylinders independently of each other,
20 on the basis of the fluid pressurized by said pressurizing device;

a diagnosing device for diagnosing each of said plurality of pressure control valve devices for any abnormality thereof;

25 a second hydraulic pressure source operable by an operation of a manually operable brake operating member, to pressurize the fluid to a pressure which corresponds to an operating force acting on said brake operating member and which is higher than a level of the fluid pressurized by said

operating force;

5 a cutting-off device including a first cut-off valve disposed between said second hydraulic pressure source and said at least one first brake cylinder and operable between an open state in which said second hydraulic pressure source and said at least one brake cylinder are communicated with each other and a closed state in which said second hydraulic pressure source and said at least one first brake cylinder are disconnected from each other, and a second cut-off valve disposed between said second hydraulic pressure source and said at least one second brake cylinder and operable between an open state in which said second hydraulic pressure source and said at least one second brake cylinder are communicated with each other and a closed state in which said second hydraulic pressure source and said at least one second brake cylinder are disconnected from each other;

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25 a valve-device control device operable when said diagnosing device determines that at least one of said plurality of pressure control valve devices is abnormal, to control said first and second cut-off valves such that one of said first and second cut-off valves which corresponds to one of said first and second cylinder groups which includes said at least one pressure control valve device which is diagnosed to be abnormal is placed in said open state and such that the other of said first and second cut-off valves is placed in said closed state, said valve-device control device further controlling the pressure of the fluid in each brake cylinder of the other of said first and second cylinder groups, by controlling the corresponding normal pressure control valve

device.

53. A braking pressure control apparatus for a hydraulically operated brake, comprising:

5 a first hydraulic system including a first hydraulic pressure source which is power-operated to pressurize a working fluid and capable of controlling a pressure of the pressurized fluid, for operating said brake with the pressurized fluid delivered from said first hydraulic pressure source;

10 a second hydraulic system including a manually operable brake operating member, and a second hydraulic pressure source which is operable by an operating force acting on said brake operating member, to pressurize the working fluid to a pressure corresponding to said operating force, for operating said brake with the pressurized fluid delivered from said second hydraulic pressure source; and

15 a switching device for selectively establishing a first state in which said brake is operated by said first hydraulic system, a second state in which said brake is operated by said second hydraulic system, and a third state in which said brake is operated by said first and second hydraulic systems.

20 54. A braking pressure control apparatus according to claim 53, further comprising a switching control device operable to command said switching device to establish said third state when an amount of increase of a braking force generated by said brake, which amount is desired by an operator

of said brake operating member, is larger than a predetermined threshold.

5 55. A braking pressure control apparatus according to claim 53, wherein said switching control device commands said switching device to establish one of said second and third states, when said first hydraulic pressure source is abnormal.

10 56. A braking pressure control apparatus for a hydraulically operated brake, comprising:

15 a power-operated hydraulic pressure source for pressurizing a working fluid and capable of controlling a pressure of the pressurized fluid, for operating said brake with the pressurized fluid delivered from said hydraulic pressure source; and

20 a pressure control device operable to control a pressure of the fluid of said brake, by controlling the pressure of the fluid pressurized by said hydraulic pressure source, on the basis of an operating amount of a manually operable brake operating member, and at least one of a rate of change of said operating amount and a derivative of said rate of change.

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